call simple descriptions of natural events, 7-year-old children insert purpose information into their recollections despite its absence from the original verbal descriptions. For example, when asked to describe and explain an event sequence in which a storm washes away a crop infestation, children will indicate that the storm occurred in order to rid the crop of insects. Content analysis indicates that this tendency is not a result of any general teleological narrative convention in storybooks popular for this age group. Analyses of parent explanations of natural phenomena also indicate that it is not straightforwardly traceable to family conversations during earlier developmental periods (Kelemen et al. 2005).

These findings, and related results (e.g., Bering 2003; Evans 2001), raise an intriguing possibility not considered in the present article. Perhaps human beings are not simply inclined to respond to fragmentary information by sensing a lurking agent where, potentially, none exists. Perhaps the default tendency is richer than this, and, from early childhood, people are cognitively disposed to broadly interpret many unexplained aspects of their experience in terms of the intentions and designs of some underdetermined and intangible agent (Kelemen 2004). Such a bias would obviously provide the natural substrate for forms of religious cognition that are, as A&N importantly note, a universal feature of all human cultures and, to a significant extent, intrinsic to all individual minds.

Lions, tigers, and bears, oh God!: How the ancient problem of predator detection may lie beneath the modern link between religion and horror

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Abstract: Atran & Norenzayan (A&N) claim that an appreciation of the evolved inferential machinery underlying supernatural beliefs can greatly aid us in understanding regularities in culturally shared conceptions of religion. I explore how their model provides insight into why culturally shared tales of horror (e.g., horror movies) often combine religious and predatory content.

Atran & Norenzayan (A&N) propose that religion is essentially a by-product of an evolved bias towards overattributing agency as the source of unexplained events (e.g., what was that noise in the bush?). A key feature of their argument (see Atran 2002a for the complete model) is the claim that this bias emerges from the simple evolutionary fact that the recurrent challenge of detecting predators and other dangerous agents can be characterized as a signal-detection problem (Green & Swets 1966) in which a miss would have been far more costly than a false alarm (see Atran 2002a; also Haselton & Buss 2000 for similar insights). Accordingly, they contend that hominids evolved an agency-detection system biased in favor of producing false alarms (crying wolf) rather than misses. A&N claim that one implication of this ancient bias has been the tendency to explain strange events by invoking supernatural agents rather than mundane causes such as physics or biology. After all, if natural events are explained in terms of natural causes, it should not be surprising to observe that unnaturally events are explained in terms of supernatural causes (e.g., Gods, Spirits, Ghosts). Although A&N do not claim that the pan-cultural existence of beliefs in supernatural agency is itself an evolutionary adaptation, they do claim that appreciating the evolved inferential machinery underlying such beliefs can greatly aid us in understanding regularities in culturally shared conceptions of religion and the supernatural. Along these lines, I argue that A&N's model can offer insight into why modern humans often combine religion and predators in their culturally shared tales of horror.

A core feature of A&Ns model centers on the claim that interactions with dangerous predators constituted a significant selection pressure that shaped the design of our evolved inference-making machinery. Although the Wizard of Oz trio of modern day alpha predators — lions, tigers, and bears — has historically been quite capable of stalking and killing large primates, the genus homo does not currently constitute — and probably never has constituted — a significant portion of the dinner plate of alpha predators when compared to ungulates and small mammals (see Ever 1973; Sunquist & Sunquist 1980). Nonetheless, the hunting and foraging strategies of hominids and large carnivores would have likely placed these two groups in direct competition for access to scavenged meat at kill sites. Although the much smaller canid predators (wolves, hyenas) may have posed a threat to our ancestors, the canine strategy of hunting in packs likely diminished the ability of ancestral hominids to successfully compete with canine predators for access to meat at their kill sites. By contrast, the more solitary stalk and ambush strategy of large felines (smilodon, dinofelis, homotherium, etc.) may have actually increased competition between social groups of hominids and these solitary big cats. Indeed, the fossil record suggests that ancestral hominids often scavenged the kill sites of feline carnivores and vice versa (Dunningham 1998; Trusler & Lowen 1999), leading one to believe that dangerous interactions between hominids and feline predators were quite common in the Pleistocene. Paralleling these fossil findings, lethal interactions with modern-day lions, tigers, and bears most often transpire when humans attempt to chase these large predators from recent kills or scavenging sites (Quammen 2003). It is not inconceivable that recent carnivore—hominid interactions of these sorts could have shaped the design of the mental mechanisms that humans employ when making inferences about predators, as A&N claim.

In regard to predator images in horror movies, it is not hard to see how a predisposition toward inferring the presence of dangerous animate agents could result in a preponderance of solitary ambush predators as culturally shared fear stimuli. In this regard it is interesting to note how a disproportionate sample of horror movie plots begin with a strange, unexplained occurrence (a person is mysteriously killed or disappears), and the responsible agent is initially presented only in fleeting glimpses (Jurassic Park) or not at all (The Blair Witch Project). Often these supernatural monsters are depicted as little more than solitary ambush predators dressed up in culturally contrived monster attire. Indeed the very term monster implies a large, menacing, unnaturally shaped animal. Consider, for example, the numerous depictions of exaggerated real-world predators that populate film ranging from unnaturally large sharks (Jaws) and enormous primates (King Kong), to man-eating lions with almost supernatural cunning (Ghosts in the Darkness). Finally, horror movie monsters are often depicted as solitary and nocturnal ambush predators (The Blair Witch Project, Psycho), often equipped with fangs and claws (Dracula, The Wolfman). There is even an entire horror movie genre devoted to solitary hominid predators in the form of cunning serial killers (Nightmare on Elm Street, Friday the 13th), many of whom appear desirous of disemboweling their victim's flesh (e.g., Silence of the Lambs, The Shining, etc.). In this regard, A & N's claim that humans possess a predisposition toward inferring the presence of dangerous animate agents might be a useful starting place for researchers interested in understanding the content of modern horror films and the psychological mechanisms underlying audience reactions to this genre of popular media (see Wveare & Tamborini [1996] for a review of recent research in this area).

Finally, in regard to religious imagery in horror films, it is interesting to note the apparently nonrandom coupling of religion and monsters. For example, the litany of solitary ambush predators from the classic horror movies of the 1930s (e.g., Dracula, Wolfman, etc.) were often thwarted through instruments of religious significance: Werewolves were killed with special silver bullets, and fanged vampires were repelled by Holy Crosses. More
over, the one horror film routinely mentioned as perhaps the most frightening movie of all time (The Exorcist) depicts a religious agent summoning supernatural powers to aid a young girl who is transformed into a monster via demonic possession. In this light, it is not inconceivable that the evolved inferential machinery underlying beliefs in supernatural agents could give rise to a fertile, culturally constructed imaginary world populated by predatory monsters and supernatural religious instruments that function to protect us from these dangerous agents. Although this hypothesis — link between religion and predators in popular horror movies (suggested by A&N’s model) is based largely on anecdotal evidence, these claims easily lend themselves to more rigorous scientific investigation such as content analysis of popular media (see Ketelaar 2004; Weaver & Tamborini 1996).

The evolutionary social psychology of religious beliefs

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Abstract: Atran & Norenzayan (A&N) are correct that religion is an evolutionary by-product, not an adaptation, but they do not go far enough. Once supernatural beliefs are enabled by processes they describe, numerous social-cognitive mechanisms related to attachment, social exchange, coalitional psychology, status and dominance, and kinship are crucial for explaining the specific forms religion takes and individual and cultural differences therein.

It has long been speculated — sometimes explicitly but more often implicitly — that humans possess some kind of religious instinct that explains observations such as the apparent universality across human societies, the genetic heritability of religiousness, neurocological evidence of a “God module” in the brain, and ethological observations of proto-religious behavior in other species. As I have argued elsewhere (Kirkpatrick 1999b), none of these observations constitutes convincing evidence for a religion as an adaptation, and moreover, such arguments invariably (1) err in identifying the proposed mechanism’s adaptive function (e.g., by falling into traps such as naive group selectionism, confusing psychological benefits with reproductive success, or failing to acknowledge adaptive costs); (2) fail to specify the mechanism’s design (e.g., by clearly describing what exactly it does, the conditions that activate or deactivate it, etc.); and (3) fail to demonstrate that the mechanism meets the defining criteria of an adaptation, such as economy, efficiency, reliability, and precision.

The central insight that religion is not an adaptation, but rather a reliably produced collection of by-products of human evolved psychology, neatly explains those observations that render an adaptationist hypothesis tempting while avoiding the pitfalls. Religious beliefs and behaviors are produced and shaped by a host of evolved psychological mechanisms and systems that were designed for other (mundane) purposes. This insight changes the form of evolutionary explanation from one of identifying design and function to identifying which psychological mechanisms are involved, and explaining how and why these reliably produce the by-product (Buss et al. 1998).

Building on work by Buss (1994; 2001), Sperber (1996), Guthrie (1993), and others, Atran & Norenzayan (A&N) identify one such crucial set of psychological mechanisms as those designed for understanding and predicting the natural world — those related to so-called folk (or naive, or commonsense) physics, biology, and psychology — which often misattribute agency and human characteristics to inanimate objects or events and thereby give rise to psychological animism and anthropomorphism. This set of evolved mechanisms represents the first crucial step in the religion-as-by-product argument and, as A&N demonstrate, explains why beliefs about supernatural forces and gods are so widespread. However, this is only the first step toward the much larger theory required to explain religion.

I have argued (Kirkpatrick 1999b; 2005) that once beliefs about supernatural agents are enabled by the processes described by A&N and others, the door is opened for a plethora of evolved social-cognitive mechanisms to whir into action, producing and shaping specific beliefs about these supernatural agents and our relationships with them. For example, the attachment system appears central to the psychology of many belief systems, wherein God or other divine figures (e.g., Mary or Jesus in various forms of Christianity) function as attachment figures. In other cases, gods are perceived as social-exchange partners who, per reciprocal-altruism principles, provide various benefits to people in exchange for the performance of requisite sacrifices or ritual observance of specified codes of behavior. In still other cases, gods are processed psychologically by mechanisms designed to negotiate status or dominance hierarchies, with high-status or dominant gods demanding submission and surrender from human subordinates (and sometimes each other). The operation of psychological systems related to kinship and kin-based altruism is evident in such beliefs as God-as-Father and the widespread practice of ancestor worship. Mechanisms of coalitional psychology construe gods as members or leaders of local groups or tribes in competition with other groups or tribes (and their gods).

In addition to giving detailed formal diagrams about supernatural agents, these same psychological systems underlie other aspects of religious thinking, including the nature of interpersonal (human) relations. For example, human religious leaders, like gods, may be perceived alternatively as attachment figures, high-status individuals, or coalition leaders; fellow worshippers may be perceived as kin (e.g., “we are all children of God”) or social-exchange partners. Religion-based morality variously reflects the role of social-exchange thinking (“an eye for an eye”), kinship (fellow worshippers as “brothers and sisters”), and coalitional psychology (“love thy neighbor” applies only to the in-group).

Moving to this social-psychological level of analysis is also essential for addressing the crucial issues, explicitly skirted by A&N, of individual and cross-cultural differences in religion. Such questions can be tackled at (at least) two levels of analysis within this framework. First, religious differences reflect varying combinations of the particular social-cognitive mechanisms that underlie them. Certain forms of Christianity, for example, seem particularly attachment-based, whereas other belief systems more strongly reflect coalitional psychology or social-exchange thinking. Within a given belief system, individual differences can emerge as a consequence of differential activation of these various mechanisms. Second, each of these psychological systems is associated with dimensions of individual differences within its particular domain. For example, the attachment system reliably gives rise to well-documented individual differences in attachment patterns or styles — secure, insecure-avoidant, and the like — which empirical research shows to be predictive of individual differences in religious conversion and other measures of religiosity (see Kirkpatrick 1999a; 2005, for reviews). The extraordinary success of religion around the world may owe largely to the fact that, because it draws upon so many different psychological systems and different forms or dimensions of those mechanisms, it offers “something for everybody.”

In recognizing that religiousness does not itself have an adaptive function, but rather reflects a motley collection of evolved by-products, we now have a tiger by the tail. A&N have described some crucial components of that tiger — perhaps the powerful rear legs (i.e., the role of folk-physics, etc.) and a couple of other assorted parts (e.g., related to religious commitment and ritual). In my own work I have tried to sketch the outline of what I believe to be the main body of the animal. Much remains to be done, but progress should be swift once we replace the misguided religion-as-adaptation notion with a comprehensive evolutionary psychology of religion-as-by-product.